

WHAT IS CLAIMED IS:

1. A method of detecting a structural chromosomal aberration comprising:

2 435/p
536/p (a) preparing a plurality of nucleic acid probes each
4 capable of hybridizing with a separate nucleic acid
6 flanking sequence brought together by the chromosome
aberration;

8 (b) contacting the probes with chromatin under
conditions of appropriate stringency to allow
hybridization of the probes to sequences homologous
10 with the probe sequences; and

(c) detecting the presence of the probes.

2. The method of detecting a chromosomal aberration of claim
2 1 wherein the probes are labelled.

3. The method of detecting a chromosomal aberration of claim
2 2 wherein each probe label is distinct from each other.

4. The method of detecting a chromosomal aberration of claim
2 3 wherein the probes are further defined as at least
approximately 800 kb apart.

5. The method of detecting a chromosomal aberration of claim
2 4 wherein the labels comprise fluorescent labels.

6. The method of detecting a chromosomal aberration of claim
2 5 wherein the fluorescent labels are microscopically
distinct as different colors.

7. The method of detecting a chromosomal aberration of claim
2 6 wherein the fluorescent labels comprise digoxigenin-11-
dUTP and biotin-11-dUTP.

8. The method of detecting a chromosomal aberration of claim
2 1 wherein the chromatin-probe contacts occur *in situ* in
cells.
9. The method of detecting a chromosomal aberration of claim
2 8 wherein the cells comprise those in interphase of
mitotic division.
10. The method of detecting a chromosomal aberration of claim
2 9 wherein the probes are juxtaposed in interphase as
doublets if a chromosomal aberration is present.
11. The method of detecting a chromosomal aberration of claim
2 10 wherein the chromosomal aberration is further defined
as comprising a translocation.
12. The method of detecting a chromosomal aberration of claim
2 11 wherein the translocation is formed by breakpoints
which occur on the long arms of human chromosomes No. 9
4 and No. 22.
13. The method of detecting a chromosomal aberration of claim
2 12 wherein the translocation breakpoints are further
defined as occurring at the locations designated
4 t(9;22)(q11;q34).
14. The method of detecting a chromosomal aberration of claim
2 13 wherein the translocation breakpoints are further
defined to occur in the BCR and ABL genes respectively,
4 and a fusion gene is formed by the translocation, and
said fusion gene comprises portions of the BCR and ABL
6 genes.
15. The method of detecting a chromosomal aberration of claim
2 14 wherein the fusion gene is designated as p190.

16. The method of detecting a chromosomal aberration of claim 10 wherein the probes consist of those selected from probes designated PEM12, c-H-abl and MSB-1.

17. The method of detecting a chromosomal aberration of claim 8 wherein the cells comprise samples of human tissues.

18. The method of detecting a chromosomal aberration of claim 17 wherein the human tissue samples comprise peripheral blood.

19. The method of detecting a chromosomal aberration of claim 17 wherein the human tissue samples comprise bone marrow.

20. The method of detecting a chromosomal aberration of claim 8 wherein the cells comprise a sample of cultured cells.

21. A genetic probe capable of hybridizing to the 5' region of the major breakpoint cluster region (M-bcr) of chromosome 22 as illustrated in FIG. 2A and FIG. 4.

22. A genetic probe capable of hybridizing to the first exon region of the BCR gene as illustrated in FIG. 2A.

23. A genetic probe designated as c-H-abl and capable of hybridizing to the 3' end of the ABL gene as illustrated in FIG. 5 and FIGS. 2B and 2C.

24. The genetic probe of claim 21 wherein the probe comprises the designation PEM12.

25. The genetic probe of claim 22 wherein the probe comprises designation MSB-1.

26. The genetic probe of claim 23 wherein the probe comprises designation c-H-abl.

435/6 27. The method of detecting a chromosomal aberration of claim
2 1 wherein the plurality of probes comprise MSB-1, PEM12
4 and c-H-abl, and said probes are contacted to chromosomes
in pairs.

Sub
28. The method of detecting chromosomal aberrations of claim
2 27 wherein a first pair comprises MSB-1 and c-H-abl, and
a second pair comprises PEM12 and c-H-abl.

435/6 29. A kit for the detection of chromosomal aberrations
2 comprising at least two genetic probes selected from
4 claims 21, 22 and 23, and appropriate controls, each in
separate containers.

Sub
30. A kit for the detection of cancer in human cells,
comprising:

- 6 a) a carrier being compartmentalized to hold multiple
containers;
b) a first pair of containers including the pair of
genetic probes of claims 21 and 23; and
8 c) a second pair of containers containing the pair of
genetic probes of claims 22 and 23.

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B3

add
D6

add
E11